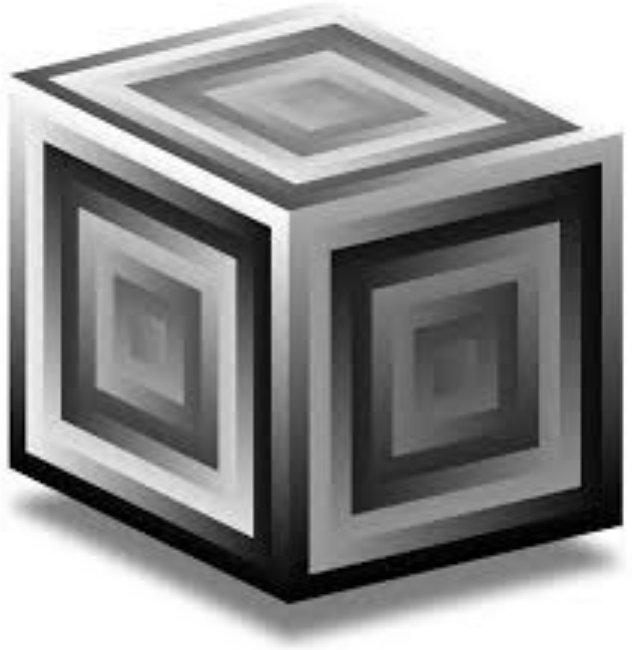
Playing Audio Files

Topics Addressed

- Types of Audio Files
- Buffers
- File Paths
- PlayBuf
- Playback Rate



Audio File Formats

- SuperCollider can only play certain kinds of audio files
- Audio files are represented digitally as a sequence of numbers
- There are **many** different formats of audio files
  - Compressed vs. uncompressed
  - Lossless vs lossy
  - Uncompressed and lossless: .wav, .aiff
  - Compressed and lossless: .flac
  - Compressed and lossy: .mp3, .m4a
- For SuperCollider, stick to .aiff and .wav

Buffer

- In general, a buffer is allocated space to hold audio samples.
  - We'll learn shortly that audio files are represented digitally in computers as a list of numbers. We call those numbers samples.
  - While audio samples are generally stored in a buffer, a buffer can technically hold any type of data provided it fits within the allocated space.
- In SuperCollider, the class `Buffer` is an sclang abstraction for an scsynth buffer on the server which can store samples.
- We will use `Buffer` to hold the samples.
  - Each buffer will created on the server will be assigned a number specifying which buffer it is.

Creating a Buffer for an Audio File

- The easiest way to store an audio file in a buffer is through `Buffer.read`
- You need to provide the path to the audio file. Paths are tricky to understand and the notation is different depending upon the operating system.

Understanding Absolute File Paths

MacOS /Linux/Unix Machines:

```
/folder1/folder2/folder3/audio_file.wav
```

Windows Machine:

```
C:\folder1\folder2\folder3\audio_file.wav
```

- File paths are typically denoted as a series of slash-separated folder names starting from the top of your file tree down to the file or folder that you are referencing.
- Notice the difference between slashes on Macs vs. Windows machines
- Absolute paths start at the root folder/drive of a system and denotes the series of folders to the target file/folder.
- Absolute paths begin with a slash.

Understanding Relative File Paths

MacOS /Linux/Unix Machines:

`folder/audio_file.wav`

Windows Machine:

`folder3\audio_file.wav`

Relative Path:	`folder/audio_file.wav`
Current Working Directory:	`/folderA/folderB`
Absolute Path:	`/folderA/folderB/folder/audio_file.wav`

- Relative file paths are a piece of a filepath that is relative to the location of some other folder or file, generally the current folder of the file you are working in (sometimes called the current working directory a.k.a. CWD).
- The advantage of a relative path is you can move the CWD to different parts of your file system and the relative path still refers to the same subfolders or files.

thisProcess.nowExecutingPath

- To get the absolute file path of your SuperCollider file, you can use `thisProcess.nowExecutingPath`
  - Note that this file must be a saved file on your system.
  - Note that this only works for .scd files and not for Notebooks.
- To get the current working directory, we can use the string method `.dirname` => `thisProcess.nowExecutingPath.dirname`
- To join paths together using a slash, use the operator +/+ which will join paths using forward slashes and backward slashes depending upon your operating system.

Example

- Imagine we want to load a sound file called guitar.wav in the same folder as our .scd file to a buffer.

```
(
~guitar_buf = Buffer.read(
    s,
    thisProcess.nowExecutingPath.dirname +/+ "guitar.wav"
);
)
```

UGen: PlayBuf

- The UGen `PlayBuf` is the quick, easy way to play audio files in SuperCollider.
- Arguments:
  - Number of audio channels – usually 1 or 2 for mono/stereo, respectively
  - Buffer Number
  - Rate of playback – 1 is for normal playback
  - Trigger – a trigger to jump to the starting position
  - Starting position – a position in sample number where to start
  - Loop – whether to loop the audio file (1 – yes, 0 – no)
  - Done action

Ugen: PlayBuf Example

For mono sounds:

```
SynthDef(\mono_play, {
  arg outBus = 0, buf, rate = 1, loop = 0, amp = 1;
  var sig = PlayBuf.ar(1, buf, rate: rate, loop: loop, doneAction: 2);
  sig = sig ! 2; // convert mono sound to stereo array to hear out of both speakers
  Out.ar(outBus, sig * amp);
}).add;
```

For stereo sounds:

```
SynthDef(\stereo_play, {
  arg outBus = 0, buf, rate = 1, loop = 0, amp = 1;
  var sig = PlayBuf.ar(2, buf, rate: rate, loop: loop, doneAction: 2);
  Out.ar(outBus, sig * amp);
}).add;
```

Playback Rate

- Changing the playback rate on audio files can create interesting effects.
- In SuperCollider the default playback rate in `PlayBuf` is 1, indicating a normal rate of play.
- A playback rate higher than 1, increases the speed at which the audio is played back. However, it increases the pitch of the audio file as well as samples are dropped or interpolated. A playback rate of 2 will halve the duration of the audio file but double the pitch.
- A playback rate less than 1, decreases the speed at which the audio is played back. However, it decreases the pitch of the audio file.